

No Thanks to a Tornado

To Auntie Em, Dorothy, Toto, and the residents of America's heartland, the fury of a spring tornado is not to be underestimated. Those who reside in the mid-Atlantic region, however, are more apt to fear the spring floods and autumn hurricanes rather than the havoc wreaked by the unpredictable path of a twister. Yet, each year many buildings in the mid-Atlantic region, some historic, are damaged by the strong winds and pounding rains of the ominous funnel clouds that rip across the landscape.

Standing proud on the rise of a hill near Chambersburg in south central Pennsylvania, the historic Rocky Spring Presbyterian Church withstood the attack of a short-lived but vicious tornado late in the afternoon of May 11, 1996. Built in 1794, the 3,000-square-foot elegant brick church was pummeled by winds gusting up to 100 mph as the F-0* rated tornado struck from the south, causing the collapse of the brick gable and tearing away over one third of the roof. This article focuses of the careful restoration of this cherished landmark listed on the National Register of Historic Places.

Almost immediately after the tornado hit, the call for help went out. Many of the volunteers who had seen combat up close and personal likened the devastation to a bomb scene. Shattered trees with broken limbs made access to the church nearly impossible. Sections of the roof littered the churchyard. Once volunteers gained access to the interior, they were very depressed. Unchanged for over 200 years and actively used until 1921 when the local chapter of the Daughters of the

American Revolution leased the building from the Carlisle Presbytery, this well-maintained church had been partially destroyed in a few moments of furious destruction.

The south gable brick wall, which measured 50 feet wide and a little over 20 feet tall from the ceiling to the peak, collapsed from the impact of the winds hitting head-on. As the winds passed over the building, a vacuum was created that lifted large sections of the 60-square (a square is 100 square feet in area) roof off the south end. A 12-square section of rafters, sheathing, and roofing shingles on the east slope lifted and sailed high up over the north end of the building to land on the cemetery fence some 50 yards away. A 10-square west slope section of the roof also sailed away to land harmlessly in the west yard some 20 yards from the church. Unfortunately, the damage was not limited to the gable wall and roof.

As the roof tore away, a series of king-post principal trusses that supported the roof remained in place. The collapsing gable brick wall cracked the first principal truss a few feet inside the south wall. Some 22 tons of brick and mortar were pushed into the king post truss before falling and breaking out several hundred square feet of the beautifully coved original plaster ceiling. Another ton of plaster, lath, and secondary framing cascaded to the sanctuary floor.

Inside the beautifully preserved sanctuary, the force of the tornado was equally evident. The pews and their paneled box walls were all original, hand planed and unpainted. The pew box doors retained the names of the families who occupied the pews. Four of these original pews and their boxes were crushed into splintered wood by the weight of the debris. Several of the surrounding boxes and pews were damaged.

Once the winds opened up the roof, the pressure between the interior and exterior equalized and the structural damage caused by the storm came to an abrupt halt. Unfortunately, the rains pounded down into the building for hours after the storm adding extensive water damage throughout the church interior. The wind-driven rain soaked the wood directly below the large

Rocky Spring Presbyterian Church near Chambersburg, Pennsylvania, a few days after the F-0 rated tornado with 110 mph winds toppled the south gable and tore off 22 squares of roofing and rafters. Photo taken May 23, 1996.





Twenty-two tons of brick, mortar, plaster, lath, and framing fell to the sanctuary floor crushing four box pews and two original deacon benches. The debris was carefully sifted for all salvageable materials. Photo taken May 23, 1996.

opening in the roof as well as the surrounding plaster of the ceiling. As the plaster became water logged, more of the ceiling and lath fell to the floor.

In spite of its condition, never a thought was given to the demolition of the church. Community residents rolled up their sleeves and went to work. The day after the storm, the author was called and went up and helped to guide the building cleanup efforts as the Boy Scouts from a local troop and other members of the community carefully sifted the debris for all salvageable brick pieces. Even the old mortar was salvaged for re-use as part of the new mortar. Work crews from Brechbill and Helman, Inc, a local contracting firm, temporarily built a frame over the gaping hole in the roof and covered it with tarps. Over the next several weeks a member of the board of trustees stopped by daily to open and close the windows so the dampened interior could dry out.

Fortunately, the church's insurance policy covered tornado damage. The insurance company as well as the board of trustees of the church contracted Preservation Associates, Inc., of Hagerstown, Maryland, to restore the destroyed portions of the church back to their original conditions. Before beginning restoration, the firm first determined the full extent of the damage, established the best course for restoring the building, and detailed the costs for repairing the damage.

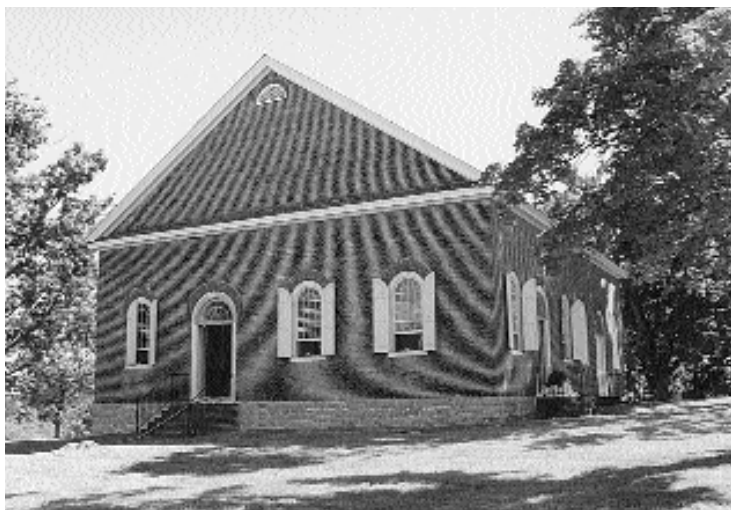
The pews were restored using the original materials. Less than 5% of the original wooden components was lost. Even the pieces deemed non-salvageable were cut into small pieces and used for dutchmen repairs. Replacement wood was taken from leftover scaffolding lumber left in the attic in 1794. Photo taken July 31, 1997.

The restoration plan outlined three major phases. First the exterior shell had to be rebuilt. Then the interior woodwork of the crushed and damaged pews, paneled pew box walls and doors, and deacons benches had to be carefully restored. Finally, the plaster ceiling had to be repaired, the damaged windowpanes replaced with older wavy glass, and paint coatings on the walls renewed.

The south gable was rebuilt using as many of the original bricks as possible and older bricks salvaged from a brick house (c. 1820) that was gutted by fire and slated for demolition. The original mortar used in the church was good quality sand, clay, and lime mixed with a visible small aggregate of streambed sediment. The new mortar was one part white mason's mortar that consisted of half stone dust and half lime, an additional one-quarter part of mason's hydrated lime and three parts of a local bank sand with a natural dark tan color. The final ingredient was one part of salvaged original mortar, which was finely ground and added to the new mix. By varying the sand color and using the older mortar reground and added to the new mortar, the firm managed to achieve an almost perfect color match to the historic mortar. After the mortar dried, it was very difficult to tell where the rebuilt section began and the older surviving section ended.

Experienced crews restored the damaged king-post truss to good strength by using epoxy consolidation methods to impregnate the damaged and cracked areas. Two metal straps running up the bottom of the king post near the damaged area of the post worked to our advantage; and, as





The 1794 Rocky Spring Presbyterian church with the original bricks reset with a soft mortar, all the trim work restored, and the pent roof restored. Photo taken July 3, 1997.

a result, the beam required no additional reinforcement to prevent the reconsolidated area from cracking in the future.

All but two of the smaller intermediate rafters were salvaged. The craftsmen extracted dutchmen pieces from the two non-salvaged end rafters for repairing the other visible intermediate rafters. The intermediate rafters visible to the attic were all restored and set back in their original locations. New poplar rafters were sawn on a modern circular sawmill to the same dimensions as the originals. These pieces were dried at a local kiln and placed over the restored south gable wall where they cannot be seen from the interior of the attic. The rafters were marked with the date of their replacement for future researchers.

The original roof sheathing was carefully canvassed and salvaged where possible; however, much of it needed to be replaced. Where replacement sheathing was necessary, rough-sawn poplar replaced the original northeastern white pine, which today is hard to find in quantity and quality. All the boxing, pent-roof areas, cornices, and bargeboards were restored with very few pieces requiring replacement. All profiles were matched and the new pieces marked with the dates of their installations. The roof was covered with a 30-year fiberglass shingle.

On the interior, Preservation Associates, Inc. sifted the debris piles for all salvageable wooden components and staged them where they would dry. The crushed pews were carefully extracted from where they lay in a heap on the floor. Craftsmen experienced in restoration of damaged properties retrieved one piece of crushed wood at a time from the wreckage, identified its original location, and tagged it. The sal-

vaged pieces were assembled like a giant jigsaw puzzle and analyzed for salvation and repair versus replacement. When the few non-salvageable pieces were set aside, the craftsmen identified how much good wood was in each badly damaged piece and what portions might be salvaged for use as dutchmen to repair nicks, holes, and splintered edges in the rest of the pew wood to be salvaged.

The dilemma facing the restoration team was that the pews were never painted. Any repairs would forever be very visible. Care was taken to salvage as much wood as possible since the original wood had the patina matching the rest of the original pews. Although some new edges were exposed, the restoration crew carefully matched grain structures, and decided to let the atmosphere form a patina on the new edges. Lacking enough wood to finish the job, a search of the market for salvage wood with the right grain and color took weeks. Eventually the author discovered in the attic a few remaining scaffolding boards left from the original construction. Only one large board was retrieved from the attic space for remanufacture into the replacement piece needed on one of the four crushed pews. The wood salvaged from the attic worked perfectly.

It took nearly 16 months to slowly and carefully restore the church from May 11, 1996 to August 24, 1997 when it was rededicated. Today, the 50-foot by 60-foot single room Rocky Spring Presbyterian Church stands as it did previous to the storm damage, a much beloved landmark on the local rural scene. The doors open once a year for a memorial service and occasionally for weddings. The patches in the pew woodwork stand out to say the building was lovingly restored and continues in use. The church was restored using every method available for salvaging the original components and replicating the components that were damaged beyond salvage. The church had a total restoration cost of \$150,000 or \$50 per square foot.

Note

- * The scale is called the Fujita scale after Ted Fujita at the University of Chicago. An F-0 tornado is one that is not expected to cause much damage. An F-5 is one that will cause catastrophic damage.

Douglass C. Reed, founder of Preservation Associates, Inc., Hagerstown, Maryland, was the consultant for this project. While Mr. Reed has worked on brick, stone, and timber frame structures, his sub-specialty is log structures.